

## Clarification of North Dakota Century Code – Coordinate Systems

February 2019

It has become readily apparent through our interactions with contractors and vendors to the State that the coordinate systems as defined by North Dakota Century Code are in need of clarification, both in terms of the language and descriptions. The intent and meaning within this section of the ND Century Code is not spelled out to the extent that it is within modern mapping systems, and as such, we felt it necessary to match the intent and language of the ND Century Code to the more detailed parameters and descriptions used in current mapping systems.

A search of the ND Century Code records reveals that the coordinate definitions as stated are simply for North Dakota State Plane Coordinate Systems (ND SPCS), both North and South Zones, using either the North American Datum of 1983 (NAD83) or the North American Datum of 1927 (NAD27). The coordinate units for the NAD83 version are International Feet (defined as 0.3048 meters exactly), which is a very clean and easy conversion to use considering the original meter coordinate unit designation of the NAD83 North Dakota State Plane Coordinate System. The coordinate unit used for the NAD27 version is the US Survey Foot which matches the original, designed definition of the NAD27 North Dakota State Plane Coordinate System.

See ND Senate Bill SB2472 (1975) and ND House Bill HB1377(1989) for historical context

The biggest problem, in terms of our modern usage, is that the Century Code does not specify the datum realization for either specified coordinate system. For example, we now have many different offerings of the NAD83 including NAD83(1986) which is the original version, NAD83(1996) which is the 1996 Continuously Operating Reference Stations (96CORS), the NAD83(2007) which is National Spatial Reference System of 2007 (NSRS2007) and the NAD83(2011). Additional problems arise regarding the datum and the ellipsoid choices for all these versions. For example, when the NAD83 (1986) was originally published, the difference between the underlying Geodetic Reference System of 1980(GRS80) and World Geodetic System of 1984(WGS84) was so minimal that conversion from one to the other would result in more error being introduced than by simply renaming from one to the other. That has now changed, and it is advised that a transformation routine be used to convert from GRS80 to WGS84 and of course, this is all due to updates in these systems. So once again, it is important, in reference to the ND Century Code, that these parameters are specified clearly no matter how old or “outdated” they may seem to be. One major benefit to using an old definition is that it is very well-known and has been extensively used by the mapping professions.

It is clear that the version of NAD83 used in the North Dakota Century code was based on the 1986 determination as there was no other option when the legislation for the NAD83 version was amended to the century code during the 1989 North Dakota legislative session. (See ND Senate Bill SB2472 (1975) and ND House Bill HB1377(1989) for historical context)

Posted below are the projection definitions as approved by the North Dakota GIS Technical Committee and the Office of the State Engineer in a clear concise format such as what Esri uses when they display coordinate system parameters.

## North Dakota State Plane Coordinate System of 1983, North Zone, NAD83 (1986), Intl Ft

European Petroleum Survey Group Code - EPSG:2265

```
PROJCS["NAD83 / North Dakota North (ft)",  
  GEOGCS["NAD83",  
    DATUM["North_American_Datum_1983",  
      SPHEROID["GRS 1980",6378137,298.257222101,  
        AUTHORITY["EPSG","7019"]],  
      TOWGS84[0,0,0,0,0,0,0],  
      AUTHORITY["EPSG","6269"]],  
    PRIMEM["Greenwich",0,  
      AUTHORITY["EPSG","8901"]],  
    UNIT["degree",0.0174532925199433,  
      AUTHORITY["EPSG","9122"]],  
      AUTHORITY["EPSG","4269"]],  
    PROJECTION["Lambert_Conformal_Conic_2SP"],  
    PARAMETER["standard_parallel_1",48.73333333333333],  
    PARAMETER["standard_parallel_2",47.43333333333333],  
    PARAMETER["latitude_of_origin",47],  
    PARAMETER["central_meridian",-100.5],  
    PARAMETER["false_easting",1968503.937],  
    PARAMETER["false_northing",0],  
    UNIT["foot",0.3048,  
      AUTHORITY["EPSG","9002"]],  
    AXIS["X",EAST],  
    AXIS["Y",NORTH],  
    AUTHORITY["EPSG","2265"]]
```

## North Dakota State Plane Coordinate System of 1983, South Zone, NAD83 (1986), Intl Ft

European Petroleum Survey Group Code - EPSG:2266

```
PROJCS["NAD83 / North Dakota South (ft)",  
  GEOGCS["NAD83",  
    DATUM["North_American_Datum_1983",  
      SPHEROID["GRS 1980",6378137,298.257222101,  
        AUTHORITY["EPSG","7019"]],  
      TOWGS84[0,0,0,0,0,0,0],
```

```
AUTHORITY["EPSG","6269"],
PRIMEM["Greenwich",0,
AUTHORITY["EPSG","8901"],
UNIT["degree",0.0174532925199433,
AUTHORITY["EPSG","9122"],
AUTHORITY["EPSG","4269"],
PROJECTION["Lambert_Conformal_Conic_2SP"],
PARAMETER["standard_parallel_1",47.48333333333333],
PARAMETER["standard_parallel_2",46.18333333333333],
PARAMETER["latitude_of_origin",45.66666666666666],
PARAMETER["central_meridian",-100.5],
PARAMETER["false_easting",1968503.937],
PARAMETER["false_northing",0],
UNIT["foot",0.3048,
AUTHORITY["EPSG","9002"],
AXIS["X",EAST],
AXIS["Y",NORTH],
AUTHORITY["EPSG","2266"]]
```

## North Dakota State Plane Coordinate System of 1927, North Zone, NAD27, US Ft

European Petroleum Survey Group Code - EPSG:32020

```
PROJCS["NAD27 / North Dakota North",
GEOGCS["NAD27",
DATUM["North_American_Datum_1927",
SPHEROID["Clarke 1866",6378206.4,294.9786982139006,
AUTHORITY["EPSG","7008"],
AUTHORITY["EPSG","6267"],
PRIMEM["Greenwich",0,
AUTHORITY["EPSG","8901"],
UNIT["degree",0.0174532925199433,
AUTHORITY["EPSG","9122"],
AUTHORITY["EPSG","4267"],
PROJECTION["Lambert_Conformal_Conic_2SP"],
PARAMETER["standard_parallel_1",47.43333333333333],
PARAMETER["standard_parallel_2",48.73333333333333],
PARAMETER["latitude_of_origin",47],
```

**PARAMETER**["central\_meridian",-100.5],  
**PARAMETER**["false\_easting",2000000],  
**PARAMETER**["false\_northing",0],  
**UNIT**["US survey foot",0.3048006096012192,  
AUTHORITY["EPSG","9003"]],  
**AXIS**["X",EAST],  
**AXIS**["Y",NORTH],  
**AUTHORITY**["EPSG","32020"]]

## North Dakota State Plane Coordinate System of 1927, North Zone, NAD27, US Ft

European Petroleum Survey Group Code - EPSG:32021

**PROJCS**["NAD27 / North Dakota South",  
**GEOGCS**["NAD27",  
DATUM["North\_American\_Datum\_1927",  
SPHEROID["Clarke 1866",6378206.4,294.9786982139006,  
AUTHORITY["EPSG","7008"]],  
AUTHORITY["EPSG","6267"]],  
PRIMEM["Greenwich",0,  
AUTHORITY["EPSG","8901"]],  
UNIT["degree",0.0174532925199433,  
AUTHORITY["EPSG","9122"]],  
AUTHORITY["EPSG","4267"]],  
PROJECTION["Lambert\_Conformal\_Conic\_2SP"],  
PARAMETER["standard\_parallel\_1",46.18333333333333],  
PARAMETER["standard\_parallel\_2",47.48333333333333],  
PARAMETER["latitude\_of\_origin",45.66666666666666],  
PARAMETER["central\_meridian",-100.5],  
PARAMETER["false\_easting",2000000],  
PARAMETER["false\_northing",0],  
UNIT["US survey foot",0.3048006096012192,  
AUTHORITY["EPSG","9003"]],  
AXIS["X",EAST],  
AXIS["Y",NORTH],  
AUTHORITY["EPSG","32021"]]